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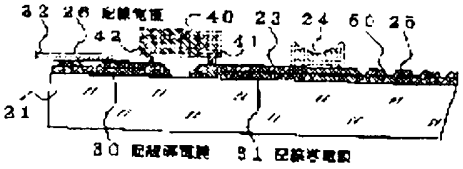
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(54) LIQUID CRYSTAL DISPLAY DEVICE

(57)Abstract:

PURPOSE: To prevent a short-circuit accident between conductive films and transparent electrodes and to decrease crosstalks, contrast degradation or nonuniform display by providing transparent electrode layers without via insulating films on the conductive films provided on a substrate and separating the conductive films by each of these transparent electrodes.



CONSTITUTION: After the conductive film is provided over the entire surface of the substrate 21, the wiring conductive films 30 for backing of wiring electrodes 26, the wiring conductive films 31 for backing the wiring parts of pixel electrodes 23 and the light shielding conductive films 25 are formed by etching. The transparent electrode film is then formed over the entire surface of the substrate and thereafter, the wiring electrodes 26 and the pixel electrodes 23 are formed by etching. Namely, the conductive films 30, 31 are connected to the wiring electrodes 26 or the pixel electrodes 23 and are separated by each of the respective electrodes and, therefore, the generation of the short-circuit accident is obviated and the respective electrodes are decreased in resistance value by the conductive films in contact therewith. The wiring parts of the pixel electrodes 23 are provided with the wiring conductive films 31, by which the difference in the resistance is decreased and the nonuniformity of the display state is eliminated.

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CLAIMS

[Claim(s)]

[Claim 1] The liquid crystal display characterized by having the structure where an insulator layer is not prepared between the transparent electrodes prepared on the electric conduction film and the electric conduction film on the substrate.

[Claim 2] It is the liquid crystal display according to claim 1 characterized by having prepared the slit corresponding to the pixel electrode of each [film / electric conduction / this] preparing / and / a pixel electrode, and dissociating through an insulator layer at the electric conduction film top which avoided and prepared the pixel section on the substrate.

[Claim 3] The liquid crystal display according to claim 2 characterized by preparing a shading member on an opposite substrate corresponding to the aforementioned slit.

[Claim 4] The liquid crystal display according to claim 1 characterized by preparing the wiring electrode which was homogeneous as the pixel electrode and was separated with the pixel electrode through an insulator layer on the electric conduction film separately separated on the substrate.

[Claim 5] The liquid crystal display according to claim 1 characterized by preparing the portion which does not have an electric conduction film in the lower part of a connection with the other members of a wiring electrode or a pixel electrode.

[Claim 6] The liquid crystal display according to claim 2 characterized by having been almost the same as that of an electric conduction film surface, or preparing a packed bed with transparent height higher than it in the bottom of the pixel electrode of the aforementioned pixel section without the aforementioned electric conduction film.

[Claim 7] The liquid crystal display according to claim 5 characterized by having been almost the same as that of an electric conduction film surface in the lower part of a connection with the other members of the aforementioned wiring electrode without the aforementioned electric conduction film, or a pixel electrode, or preparing a packed bed with transparent height higher than it in it.

[Claim 8] The liquid crystal display according to claim 1 characterized by preparing the packed bed which has the almost same height as a pixel electrode side or an orientation film surface between pixel electrodes in the inside of a sealing agent at least.

[Claim 9] The liquid crystal display according to claim 8 characterized by giving shading nature to the packed bed

[Claim 10] The liquid crystal display according to claim 1 characterized by preparing the packed bed which has the almost same height as a pixel electrode side, a wiring electrode side, or an orientation film surface between a pixel electrode or a wiring electrode on the outside of a sealing agent at least.
[Claim 11] The liquid crystal display according to claim 8 characterized by preparing the same layer as the packed bed which has the almost same height as a pixel electrode or an orientation film surface by the inside of a sealing agent also in the outside of a sealing agent.
[Claim 12] The liquid crystal display according to claim 11 characterized by constituting so that the packed bed which has the almost same height as a pixel electrode side may cover a pixel electrode or wiring electrode top on the outside of a sealing agent by the inside of a sealing agent.
[Claim 13] The claim 6 and claim 7 which are characterized by mixing a conductive material in a packed bed, a liquid crystal display according to claim 8 or 10.
[Claim 14] The liquid crystal display according to claim 8 characterized by making into an ion adsorption layer the packed bed prepared in the almost same height as the aforementioned orientation film surface.
[Claim 15] The liquid crystal display according to claim 6 characterized by using a filler as a light filter.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]
[Industrial Application] this invention relates to the structure of a liquid crystal display. Fundamentally, a liquid crystal display makes the field which formed the pixel electrode for two substrates in which the transparent electrode (it considers as a pixel electrode below) for forming two or more pixels was formed counter, is closed with a sealing agent, and pours in and constitutes liquid crystal material in this. By the difference in the mode of monochrome, a color, a segmental die, a matrix type, an active type, a passive type or TN, STN, and others etc., although structures may differ separately. and this invention can respond to all, the following explanation explains STN and a passive matrix type monochrome liquid crystal display to it as a representative.
[0002]
[Description of the Prior Art] Based on a drawing, the conventional technology is explained below. drawing 8 (a) -- one substrate 21 -- chip-on glass (it considers as Following COG) technology -- using -- the substrate 11 of another side -- the pixel electrode 13 -- wiring of a flexible sheet etc. -- it is the cross section showing the structure which is the monochrome liquid crystal display of the conventional

passive matrix array which carries out a direct file to a member 33, and which uses the usual mounting method, and (b) is the AA' cross section in (a) In drawing 8 (a) and (b), the 1st substrate 11 and 2nd substrate 21 are closed with a sealing agent 24, and liquid crystal 14 is poured in into this closure field. The interval between both substrates (henceforth a substrate interval) is regulated by the spacer 15.

[0003] The pixel electrode 13 is formed in the 1st substrate 11. The shading electric conduction film 25 is formed on the 2nd substrate 21, an insulator layer 28 is formed on the shading electric conduction film 25, and the pixel electrode 23 is formed on an insulator layer 28. Although the orientation film is prepared in fact on the pixel electrode 13 and 23, since it is easy, illustration is omitted. Polarizing plates 12 and 22 are formed in the outside of substrates 11 and 21, respectively.

[0004] The pixel electrodes 13 and 23 intersect perpendicularly, respectively, and are arranged in the shape of parallel crosses, and the portion which both intersect serves as a pixel. The pixel electrode 23 is the outside of a sealing agent 24, and is connected to the output terminal 41 of the drive integrated circuit 40, it dissociates in the pixel electrode 23, and the input terminal 42 of the drive wiring electrode below) 26 homogeneous as the pixel electrode 23 -- having -- the wiring electrode 26 -- wiring of a flexible sheet etc. -- it connects with a member 32 moreover, the pixel electrode 13 of a substrate 11 -- direct -- wiring -- it connects with a member 33

[0005] The voltage of the difference of the driver voltage impressed to the pixel electrode 13 and the pixel electrode 23, respectively is impressed to the liquid crystal of a pixel portion, and liquid crystal changes a state with regards to the effective voltage, and participates in a display. Since an inconvenient state is presented to a display, display contrast may be reduced, since regular voltage is not impressed to the liquid crystal of portions other than a pixel, and this is prevented, the film for shading may be prepared in the shape of parallel crosses at the non-pixel section. Although this film may be non-conducting and conductive any, in consideration of the influence which a shading property and thickness have on other properties, a conductive film is used in many cases.

[0006] Drawing 8 shows the case where the shading electric conduction film 25 is used as a shading film, and this shading electric conduction film 25 is formed in the non-pixel section of a portion (it considers as a display below) by which the pixel is arranged like **** in the

display the making the substrate interval of the closure portion as abandonment near the sealing agent 24 in agreement with it of a display purpose. In drawing 8, the shading electric conduction film 25 was elongated under the sealing agent 24 the making the substrate interval of a closure portion in agreement with the substrate interval of a display purpose, it formed interval adjustment electric conduction film 29, the interval adjustment electrode 16 for substrate interval adjustment was further formed in the closure portion of a substrate 11, and the interval adjustment electrode 27 for substrate interval adjustment is formed in the closure portion of a substrate 21.

[0007] The above-mentioned COG technology is effective as the mounting method of display of having the minute pixel electrodes 13 and 23 especially. Moreover, if shown in the display which has the minute pixel electrodes 13 and 23 in this appearance, it is in the inclination for the surface ratio (effective pixel area) of the pixel section in a display and the non-pixel section to fall, and for contrast to fall, and a shading film is needed in many cases.

[0008]

[Problem(s) to be Solved by the Invention] since the drive integrated circuit 40 is formed on a substrate 21, as for one of the troubles of COG technology, resistance of the power supply line goes up -- it is a point in an inclination namely, wiring -- although addition of connection resistance with a member 32 and the wiring electrode 26, wiring resistance of wiring electrode 26 self, connection resistance with the wiring electrode 26 and the input terminal 42 of the drive integrated circuit 40, etc. becomes the cause, especially the influence by wiring resistance of wiring electrode 26 self is large The increase in resistance of the power supply line related to liquid crystal driver voltage makes the wave of the driver voltage impressed to liquid crystal produce distortion, produces gap from an ideal wave, and causes a cross talk and a contrast fall.

[0009] Moreover, in order to gather up intensively the leading-about portion to the integrated circuit 40 of the pixel electrode 23 in the very narrow range, in this portion, the pixel electrode 23 serves as narrow line breadth extremely, resistance increases and this also causes a cross talk and a contrast fall. Furthermore, each pixel electrode 23 also produces the problem said that resistance does not become fixed since the length of a leading-about portion differs, respectively, and a display state does not become uniform. And the resistance in the display of the pixel electrode 23 also becomes the cause of producing the phenomenon said that the luminosities of a display differ by right and left (or upper and lower sides) of a screen. Then, the 1st

technical problem which this invention tends to solve is reducing wiring resistance of the wiring electrode 26, and is reducing resistance of the leading-about portion to the drive integrated circuit 40 of the pixel electrode 23, or the pixel electrode 23 of a display.

[0010] Next, an electric short circuit will often take place between the shading electric conduction film 25 and the pixel electrode 23, and the shading electric conduction film 25 used as a shading film will reduce the yield sharply, although the insulator layer 28 insulates with the pixel electrode 23. As the cause, the detailed pinhole generated, for example in the insulator layer 28 is mentioned. Now, it is very difficult to abolish this pinhole completely. Moreover, what is depended on dust as other causes is mentioned.

[0011] There is a part which the shading electric conduction film 25 connects with the pixel electrode 23 too hastily in many cases mainly near the sealing agent 24. That is, it is because the stress which generally joins a closure portion in addition to the area of the shading electric conduction film 25 of a closure portion becoming quite big, and the probability of short circuit generating going up is larger than the stress which joins a display when the substrate interval of a closure portion is elongated display purpose like the above-mentioned. However, the short circuit in a display is not zero, either. Then, the 2nd technical problem which this invention tends to solve is losing the short circuit problem of the pixel electrode 23 and the shading electric conduction film 25.

[0012] Next, if substrate intervals differ, even if the substrate interval regulated by the spacer 15 will impress the same driver voltage with regards to the threshold voltage of liquid crystal, it will not be in the same display state. Then, the 3rd technical problem which this invention tends to solve is canceling the degradation of a display state which equalizes a substrate interval and is dependent on the heterogeneity of a substrate interval.

[0013] The accident which the dust which furthermore adhered in the exterior of a sealing agent 24 produces corrosion in a transparent electrode owing to, or ****** inter electrode short-circuits occurs. Moreover, when separating an excessive substrate portion within a process, a blemish may be given to the electrode of the exterior of a sealing agent 24, and an open circuit may be produced. Since when COG technology is used gathers up intensively the leading-about portion to the integrated circuit 40 of the pixel electrode 23 in the very narrow range as mentioned above, in this portion, the

accident poses a problem. Then, the 4th technical problem which this invention tends to solve is coping with an open circuit of the pixel electrode 23 in the exterior of a sealing agent 24, or the wiring electrode 26. That is, one is coping with it so that an open circuit may arise in a transparent electrode 23 or the wiring electrode 26 and it may not result in fatal accident, and other one is protecting a transparent electrode 23 or the wiring electrode 26.

[0014] Furthermore, although there is a process which carries out rubbing of the aforementioned orientation film in a liquid crystal display, and prepares the orientation of liquid crystal. in the inside of this process, or the other process, static electricity occurs in the wiring electrode 26 or the pixel electrode 23, and each electrode receives an injury in many cases at the time of electric discharge of this static electricity. Then, the 5th technical problem which this invention tends to solve is coping with it so that there may be no injury on the electrode by electric discharge, even if static electricity occurs in each electrode.

[0015] Moreover, it is known that the ionicity impurity contained in a liquid crystal layer will cause [of display grace, such as a nonuniformity display and seizure,] a fall. The 6th technical problem of this invention is enabling effectively application of the well-known technology proposed about this problem.

[0016]

[Means for Solving the Problem] 1st means by which this invention uses in order to solve the 4th technical problem from the above 1st is separating this electric conduction film that abolishes an insulator layer 28, and considers as the structure of preparing a transparent-electrode layer through an insulator layer on the electric conduction film prepared on the substrate, and touches each wiring electrode 26 and each pixel electrode 23 for every transparent electrode.

[0017] It is preparing the portion in which it is preparing the shading member corresponding to [in the 2nd means] the leaver section of the shading electric conduction film of a substrate 21 to a substrate 11, and the 3rd means' does not have an electric conduction film in the lower part for a connection of each transparent electrode and other members, such as a flexible sheet or a drive integrated circuit.

[0018] The 4th means is preparing the layer of the almost same height as an electric conduction film surface which becomes a portion without an electric conduction film by transparent and insulating material. the 5th means moreover, between pixel electrodes It is preparing the layer of the almost same height as the pixel electrode side which consists of an insulating material, or an orientation film surface, and the 6th

means is giving shading nature to the layer which consists of the aforementioned insulating material prepared in pixel inter-electrode further.

[0019] 7th means by which this invention uses is constituting so that the layer which has the almost same height as a pixel electrode side may cover a pixel electrode or wiring electrode top on the outside of a sealing agent by the inside of a sealing agent which consists of the aforementioned insulating material in operation of the 5th means.

[0020] The means of the octavus which this invention uses is mixing a conductive material in the layer which becomes by insulating material in the above 4th and implementation of the 6th means.

[0021] 9th means by which this invention uses is making into an ion adsorption layer the layer which becomes by insulating material in operation of the 5th means of the above.

[0022]

[Function] According to 1st means by which this invention uses, since the electric conduction film is in contact with the wiring electrode 26 or the pixel electrode 23 from the beginning and it has dissociated for every electrode, another short circuit accident does not occur and resistance reduces each transparent electrode sharply with the electric conduction film which contacts with the electric conduction film in the exterior of a sealing agent 24, even if it disconnects, they do not result carefully. According to the 2nd means, since the light which leaks from the leaver section of the shading electric conduction film of a substrate 21 is shaded by the shading member of a substrate 11, contrast does not fall.

[0023] Since the state for a connection of each transparent electrode can be easily inspected visually through a portion without an electric conduction film from the rear face of a substrate 21 according to the 3rd means, reliable display can be offered.

[0024] Since the front face of a pixel electrode serves as almost uniform height according to the 4th means and rubbing can be performed uniformly, orientation nonuniformity does not arise, and a substrate interval can also be equalized.

[0025] Since the whole front face of a substrate 21 can be mostly made into homogeneity according to the 5th means, a substrate interval is equalized further.

[0026] Since it is shaded by the layer of an insulating material which has shading nature, it becomes unnecessary moreover, for the light which leaks from the leaver section of the shading electric conduction film between the pixel electrodes 23 according to the 6th means to prepare a shading member in the opposite

exterior of a sealing agent 24, since the wiring electrode 26 and the pixel electrode 23 are covered by the layer by insulating material, doing an injury of them to an electrode at the time of substrate separation is lost. and they can also reduce the corrosion accident by dust etc. sharply.

[0028] According to the means of the octavus, since it short-circuits each adjoining inter-electrode one by the layer in which insulation was reduced, and it is revealed gradually and does not discharge momentarily by inter-electrode even if static electricity occurs in each electrode, an electrode does not receive an injury.

[0029] In order that according to the 9th means adsorption fixation may be carried out at an ion adsorption layer and the ionicity impurity contained in a liquid crystal layer may inactivate, the fall of a poor display, such as nonuniformity, and contrast is lost. and orientation nonuniformity is not produced.

[0030]

[Example] Hereafter, although a drawing explains the example of this invention, a drawing does not show only structure and does not show a size etc. Moreover, a sign uses the same sign about the same thing as drawing 8 . Furthermore in this invention, a transparent electrode means that from which an electric conduction film differs.

[0031] Drawing 1 (a) is the plan of a substrate 21 showing one example of this invention, and drawing 1 (b) is the AA' cross section of drawing 1 (a). In drawing 1 , the 1st means and 3rd means of this invention are carried out simultaneously.

[0032] In drawing 1 , after an electric conduction film is prepared all over a substrate 21, the wiring electric conduction film 30 for backing of the wiring electrode 26, the wiring electric conduction film 31 for backing of the wiring portion of the pixel electrode 23, and the shading electric conduction film 25 are formed of etching etc. Next, after a transparent-electrode film is prepared all over a substrate, the wiring electrode 26 and the pixel electrode 23 are formed of etching etc.

[0033] Although it is desirable to make it thicker than each transparent electrode in order to lower the resistance of each transparent electrode, the configuration of the wiring electrode 26, the pixel electrode 23, and the corresponding wiring electric conduction films 30 and 31 for the backing is good by each transparent electrode as for a method of a wrap so that it may not expose outside when the short circuit by the bad influence by oxidization etc. or dust can be considered. Drawing 1 shows the case where the configuration of the electric conduction film for backing is made mostly in agreement with each transparent electrode.

[0034] Drawing 2 (a) is the plan of the

substrate 21 to which the portion of the sign C in drawing 1 was expanded, and drawing 2 (b) and drawing 2 (c) are the AA'cross section and BB' cross sections in drawing 2 (a), respectively The shading electric conduction film 25 with which the aperture ended corresponding to the pixel section 50 of each pixel electrode 23 is separated by the slit 51 corresponding to each pixel electrode 23. In order for a slit 51 to prevent making it as narrow as possible in order to lessen a light transmission, and the shading electric conduction film 25 connecting the position with the next pixel electrode 23 too hastily, its middle of the pixel electrode 23 of two ****** is desirable.

[0035] Although it indicated that the width of face of the wiring electric conduction film 31 backed to the pixel electrode 23 in drawing 2 (a) or drawing 1 (a) was smaller than the width of face of the shading electric conduction film 25 For example, when a wiring portion is covered by mould material etc. in the exterior of a sealing agent 24 and the short circuit by the dust of the bad influence by oxidization of the wiring electric conduction film 31 etc. or ****** wiring electric conduction film 31 comrades etc. does not pose a problem, it is good also as the same as that of the width of face of the shading electric conduction film 25 in the width of face of Although the leading-about portion to the integrated circuit 40 of the pixel electrode 23 was shown simple in drawing 1 , the pixel electrode 23 must be intensively gathered up in the actual very narrow range, therefore in this portion, the pixel electrode 23 serves as narrow line breadth extremely, and resistance increases. And the length of the leading-about portion of each pixel electrode 23 also produces the problem said that resistance does not become fixed since it differs, and a display state does not become uniform, respectively. Since the difference of resistance becomes small by forming the wiring electric conduction film 31 in the wiring portion of the pixel electrode 23 according to this invention, the uneven trouble of a display state is also solved.

[0037] Moreover, since it is backed with the shading electric conduction film 25 except for the pixel portion also in the display, resistance falls, and the pixel electrode 23 does not produce the problem said that the luminosities of a display differ in some parts of the display screen, either. Since the shading electric conduction film 25 is in contact with the pixel electrode 23 which is separated corresponding to each pixel electrode 23 with a natural thing, and corresponds from the beginning, another short circuit accident does not generate it. Next, since

30, the resistance is reduced and said trouble is canceled.

[0038] the wiring electric conduction films 30 and 31 here for backing -- opaque -- and the wiring electrode 26 and wiring -- a connection with a member 32 -- If prepared all over the inferior surface of tongue of the connection of the wiring electrode 26 and the input terminal 42 of the drive integrated circuit 40, and the connection of the pixel electrode 23 and the output terminal 41 of the drive integrated circuit 40 The connection state of the wiring electrode 26 at the time of attaching the drive integrated circuit 40 in a substrate 21 with COG technology, the pixel electrode 23, and each terminals 41 and 42 of the drive integrated circuit 40, or wiring -- the wiring electrode 26 at the time of connecting a member 32, and wiring -- it becomes impossible to inspect visually a connection state with a member 32 from the rear face of a substrate 21

[0039] Then, if the portion 33 without the wiring electric conduction film 30 for backing is formed near a connection with the other members of the wiring electrode 26 as shown in the example of drawing 1 for example, the rear face of a substrate 21 to viewing of these connection states will be attained, and reservation of connection reliability will become easy. Although not shown in drawing 1 , it is good also considering near the connection of the pixel electrode 23 and other members as same structure.

[0040] By the way, the insulator layer 28 existed between the shading electric conduction film 25 and the pixel electrode 23 conventionally, and this insulator layer 28 absorbed the level difference of the shading electric conduction film 25 besides the function which prevents both short circuit etc., and was equipped also with the function for making the front face of an insulator layer 28 flat. However, in the example shown in drawing 1 of this invention, and drawing 2 , since the insulator layer 28 shown in the conventional example does not exist and what achieves the function of flattening does not exist, the level difference by the configuration of the shading electric conduction film 25 or the wiring electric conduction films 30 and 31 will remain as it is.

[0041] It is necessary to fully examine the influence by this level difference. The item which should be examined about a level difference is roughly divided, and those with two point and its one are related with the fixed nature of a substrate interval. That is, although a spacer 15 undertakes the function for going across a substrate interval all over display, and making it regularity, when a spacer 15 is sprinkled simply, the position of a spacer is the problem of probability and will exist in various positions. Therefore, it is necessary to make it a level difference decrease as much as

possible in the range in which the spacers 15 including the lower part of a sealing agent 24 may exist.

[0042] The case where the shading electric conduction film 25 separated to the narrow slit 51 in drawing 1 and drawing 2 was elongated to the lower part of a sealing agent 24 was shown. Of course, although you may make it the wiring electric conduction film 31 which adjoins at intervals of latus correspond, the lower part of a sealing agent 24 For example, only in the part of the thickness of an electric conduction film, the height of a spacer differs by the case where it is in the position of the case where a spacer 15 is in the position of D in drawing 2 (a), and E. It is desirable to make the substrate structure of the lower part of a sealing agent 24 similar [with the substrate structure for a display] to his wanting the substrate interval of a closure portion to be in agreement with the substrate interval of a display as much as possible in consideration of the above-mentioned point.

[0043] Above D and E -- although the position showed between the adjoining transparent electrodes 23, it is natural -- the width of face of a transparent electrode 23 of far large one is more common than the interval between the adjoining transparent electrodes 23. therefore an idea that the position of a realized Since this can be relatively said also about a relation with the transparent electrode 13 on the opposite substrate 11, most spacers 15 in a display can also do a view that it is on a pixel after all. On the other hand, since there is no pixel section in the lower part of a sealing agent 24, as a dashed line shows to drawing 2 (b), in the closure section and the pixel section, a difference will appear in a spacer at height.

[0044] Drawing 3 shows the 2nd example of the above-mentioned thought machine **** this invention, (a) is the cross section of display and (b) is the AA' cross section. In the example of drawing 3 , the interval adjustment electrodes 16 and 27 for the substrate interval adjustment on the conventional substrate 11 are abolished. Therefore, in drawing 3 (a), the substrate interval in the closure section is regulated by the path of the spacer 15 inserted into the front face of a substrate 11, and the front face of the pixel electrode 23 backed with the wiring electric conduction film 31 on a substrate 21, and is regulated by the path of the spacer 15 inserted into the front face of the transparent electrode 13 of the pixel section on the opposite substrate 11, and the front face of the transparent electrode 23 in the pixel section 50 on a substrate 21 in a display

[0045] Moreover, in drawing 3 (b), the

inserted into the front face of the pixel electrode 13 on a substrate 11, and the front face of the electric conduction film 29 for interval adjustment on a substrate 21, and is regulated by the path of the spacer 15 inserted into the front face of the transparent electrode 13 of the pixel section on a substrate 11, and the front face of the transparent electrode 23 in the pixel section 50 on a substrate 21 in a display

[0046] Then, if thickness of the transparent electrodes 13 and 23 on the thickness of an electric conduction film, a substrate 11, or a substrate 21 is made almost equal, it can go across a substrate interval all over the closure section and a display, and it can be kept uniform.

[0047] moreover, it is shown in drawing 3 (b) -- as -- the opposite substrate 11 top -- the slit 51 on a substrate 21 -- countering -- shading -- the light which will leak a slit 51 if the member 17 is formed -- shading -- it is interrupted by the member 17 and the fall of contrast can be prevented this shading -- structure of the opposite substrate 11 where the member 17 was formed may be based on the conventional method, and may be based on this invention The thing, then light filter using structure can also be conventionally prepared on the opposite substrate 11 easily.

[0048] However, the probability that a spacer 15 is located in a place higher than the pixel section 50 on the pixel electrode 23 as the dashed line showed to drawing 2 (c), though the position of a spacer 15 was mostly distributed in the pixel section probable is not zero, either. If such a situation occurs, since the substrate interval of the neighborhood will become larger than other portions, display nonuniformity will occur.

[0049] Moreover, depending on the case, it is possible that a bad influence comes out of the portion 33 which does not have the wiring electric conduction film 30 in a connection with the other members of the wiring electrode 26 when the 3rd means of this invention is carried out, as shown in drawing 1 (b) to connection since it becomes a crevice to the circumference of ****.

[0050] Other one of the items which should furthermore be examined about a level difference is related with rubbing conditions. Although the orientation film is not illustrated since it is easy for the drawing of this application, an orientation film is prepared after formation of the pixel electrode 23 in fact, rubbing of this orientation film top is carried out, and the orientation of a liquid crystal layer is readjusted. Although this rubbing is performed by usually rotating roll-like cloth material and grinding an orientation film, if a level difference is on an orientation film, cloth material will not fully touch the crevice near [this] the level difference section, but a rubbing state will differ from

heights. Therefore, since the pixel section 50 serves as a concave in the case of drawing 2 (c), when the level difference of a crevice is large, normal rubbing is not performed, but orientation nonuniformity arises, and a part for the periphery of the pixel section 50 may degrade a display.

[0051] It is process drawing showing the 3rd example of this invention for (e) solving the above-mentioned trouble from drawing 4 (a), and is a cross section corresponding to drawing 2 (c). In drawing 4 (a), the shading electric conduction film 25 is first formed in a substrate 21. Next, in (b), the transparent insulating resist 53 is applied all over a substrate 21. In (c), a resist 53 is exposed and developed by using the shading electric conduction film 25 as a mask from the rear face of a substrate 21, if suitable etching including over-etching is performed, the portion in which the shading electric conduction film 25 does not exist is fill uped with the layer of a resist 53, and a plane structure with small shading electric conduction film 25 and level difference can be obtained. In (d), a transparent-electrode layer is prepared all over a substrate, and the configuration of the pixel electrode 23 is prepared in (e).

[0052] The height in the pixel section of the pixel electrode 23 can be made almost the same as that of the non-pixel section resist 53 so that clearly from drawing 4 , therefore, even if there is a spacer 15 located in addition to the pixel section, a substrate interval is boiled and does not have a bad influence, and since rubbing of the front face of the pixel electrode 23 on the pixel section is carried out uniformly, it does not produce orientation nonuniformity, either

[0053] In the example of drawing 4 , not only the pixel section but the crevice produced into the portion 33 which does not prepare the wiring electric conduction film 30 or 31 in order to make a visual inspection easy in a connection with the other members of the wiring electrode 26 or the pixel electrode 23, since height is altogether equalized similarly in the layer of a resist 53 by the portion without an electric conduction film is lost, and the stability of connection increases more.

[0054] If it is colored a resist 53 in drawing 4 , acting as a light filter cannot be overemphasized.

[0055] By the way, the example of drawing 4 has an area of the pixel section in a display fully larger than the non-pixel section, and if it does not move after the spacer 15 moreover sprinkled sprinkling, a satisfactory good display state can be acquired especially. However, a pixel becomes minute, and when it approaches in the equal direction or there is possibility that the surface ratio of the

generating of the field from which a spacer 15 is inclined and distributed over the non-pixel section cannot be disregarded. In such a case, the substrate interval near [the] a field becomes small as compared with other portions, and a display state will differ from others partially.

[0056] Drawing 5 is drawing showing the 4th example of this invention, and (c) shows the cross section corresponding to drawing 2 (c) or drawing 4 in order of a process from (a). Drawing 5 (a) shows the state of drawing 4 (e). The insulating resist 54 which makes acrylic resin etc. the main material all over a substrate 21 in (b) is applied. In (c), a mask is used from the substrate upper surface, a resist 54 is exposed and developed, if suitable etching including over-etching is performed, between the pixel electrodes 23 will be fill uped with a resist 54, and the almost same field as the pixel electrode 23 will be acquired. Drawing 5 (d) is the AA' cross section of drawing 5 (c), and the wiring electrode 26 and the pixel electrode 23 show that it crosses to the whole surface and has uniform height.

[0057] Since height becomes almost the same also on the non-pixel section also on the pixel section, the structure, then the spacer 15 which are shown in drawing 5 go across a substrate interval all over a display, can be done uniformly, and can prevent the display nonuniformity based on the ununiformity of a substrate interval. Moreover, since it is covered by the resist 54, even if an electric conduction film top narrows the interval between electric conduction films in the exterior of a sealing agent 24, it does not have the danger of the short circuit between the electric conduction films by dust etc., so that clearly from drawing 5 . Therefore, since the width of face of the wiring electric conduction films 30 and 31 can be expanded in the exterior of a sealing agent 24, resistance of each electrode can be lowered further.

[0058] Moreover, if it carries out mixing a pigment with a resist 54 in the example shown in drawing 5 etc. and shading nature is given, since the light which leaks a slit 51 is shaded by the resist 54, contrast will not fall. in this case, shading on the opposite substrate 11 shown in drawing 3 (b) -- a member 17 becomes possible [omitting]

[0059] Drawing 6 is drawing showing the 5th example of this invention, and is a cross section corresponding to (d) from drawing 5 (a). Drawing 6 (a) shows the state of drawing 4 (e) at the time of forming a resist 53 in drawing 4 (b) more thickly than the thickness of an electric conduction film. The insulating resist 54 which makes acrylic resin etc. the main material all over a substrate 21 in drawing 6 (b) is applied. In drawing 6 (c), a mask is used from the substrate upper surface, a resist 54 is exposed and developed, if suitable etching including

over-etching is performed, between the pixel electrodes 23 will be fill uped with a resist 54, and the almost same field as the pixel electrode 23 will be acquired.

[0060] In this case, it sets, and if a resist 54 is etched only about the pixel section and the connection of an electrode, structure like drawing 6 (d) will be acquired. That is, if the wiring electrode 26 or the pixel electrode 23 removes a connection with other members in the exterior of a sealing agent 24, it is covered by the resist 54. Therefore, doing an injury to an electrode at the time of substrate separation is lost, and the corrosion accident by dust etc. can also be reduced sharply.

[0061] Next, if proper quantity mixing is carried out and a conductive material is put on resists 53 or 54 in the example shown in drawing 6 from drawing 4 , such insulation resistance can be reduced. If it does in this way, since the adjoining wiring electrode 26 or the pixel electrode 23 will be short-circuited with comparatively high resistance, static electricity generated in the electrode in each process is neutralized by comparatively high resistance by each inter-electrode one and it does not discharge temporarily, each electrode will not receive damage.

[0062] By the way, especially an orientation film was not explained in the example shown in a view 5 or the 6th view in this invention can consider three cases.

[0063] Drawing 7 is the cross section showing the example which added the process which prepares an orientation film in the example shown in drawing 6 . Drawing 7 (a) shows the case where the orientation film 55 is formed after the process of drawing 6 (c). In this case, what is necessary is just to prepare the height of the field of a resist 54 almost identically to the pixel electrode 23 as explanation of drawing 6 .

[0064] Drawing 7 (b) shows the case where formed the orientation film 55 in the state of drawing 6 (a), and a resist 54 is formed after that. In this case, it is good to prepare the height of the field of a resist 54 almost identically to the orientation film 55 unlike explanation of drawing 6 .

[0065] After it **********s the orientation film 55 after drawing 7 (c) forms the orientation film 55 after the process of drawing 6 (a), or it forms the orientation film 55 after the process of drawing 4 (d) and it **********s the orientation film 55 and the pixel electrode 23, it shows the case where a resist 54 is formed. It is good to prepare the height of the field of a resist 54

drawing 6 .

[0066] When it considers as drawing 7 (b) or the structure of (c), the field of a resist 54 will touch a liquid crystal layer and directly. In this case, technology of a publication can be effectively carried out to JP,4-320211,A (it considers as a quotation below). That is, in order that adsorption fixation may be carried out at an ion adsorption layer and an ion adsorption layer, then the ionicity impurity contained in a liquid crystal layer as it is in explanation of a quotation may inactivate a resist 54, the fall of a poor display, such as nonuniformity, and contrast is lost, and also the so-called seizure phenomenon that to active-matrix type display seen can be reduced. [many]

[0067] In the aforementioned quotation, although there is a possibility of the ion adsorption film being formed in the state where it projected on the orientation film as shown in the drawing 1 , rubbing not being normally performed as mentioned above around this projection at the time of rubbing, but orientation nonuniformity arising, and reducing display quality, much, here According to this invention, an ion adsorption layer becomes possible [utilizing the technical thought of a quotation for the maximum], without causing deterioration of such display grace, since it is almost the same as that of an orientation film surface.

[0068] In drawing 7 (b) and the difference in (c), in the case of drawing 7 (b), since a resist 54 does not contact directly, the pixel electrode 23 cannot use the means of the aforementioned octavus for a resist 54. On the other hand, since a resist 54 contacts directly in the pixel electrode 23 in drawing 7 (c), the means of the aforementioned octavus can be used for a resist 54.

[0069] Of course, drawing 7 is applicable similarly in the example of drawing 5 , although explained focusing on the example of drawing 6 .

[0070] Although explanation of the example of this invention is finished above, if supplemented, since the shading electric conduction film 25 thinks not only shading nature but conductivity as important in the invention in this application, the conductive good thing should be comparatively used as the quality of the material, and, naturally consideration of considering as multilayer structure in consideration of adhesion and stability in this case is included in the invention in this application.

[0071] Since the layer made into the resist 53 and the resist 54 did not follow a general thing process, was not explained and the function itself is not necessarily expressed, as long as it is in the layer which can be prepared alternatively, especially a resist may not limit and organic material or non-equipments is sufficient as the quality of the material of

a layer. Then, the portion made into the resist 53 and the resist 54 during the above-mentioned explanation from the reason for the above is defined as a packed bed 53 and a packed bed 54. Moreover, since these will become the thing which makes current drop off although they are high resistance very much if the 8th means of this invention is carried out, although these resists 53 and the resist 54 were made into insulation in explanation, the limitation with insulation is not attached.

[0072] Moreover, although this invention explained the electric conduction film of a display as a shading electric conduction film 25, even if it is the case of the electric conduction film used for other purposes, such as heating wire, it is applicable, being effective even if structural differences and liquid crystal modes, such as a color panel, differ from each other, of course -- obvious -- it is . In the case of the so-called active-matrix panel, at this time, a pixel electrode is read with a matrix electrode and should just be changed.

[0073] Moreover, although it went focusing on the case where it carries out with COG technology, the above-mentioned explanation is effective even when not using COG technology, for example, the pixel electrode 23 -- direct wiring -- the wiring from the portion which constitutes a pixel even if it is the a member 32 has a desirable thing small as much as possible, by carrying out the 1st means of this invention into this drawer portion, can lower resistance and, moreover, can decrease short circuit accident

[0074] Although the above-mentioned example furthermore went focusing on the substrate 21, all or a part of this inventions can be carried out also like the substrate 11 which counters, for example, the substrate 11 -- shading -- even if it is the case where a member 17 is not formed, the 5th means of this invention is applicable to a substrate 11 Moreover, an electric conduction film like the shading electric conduction film 25 with the purposes, such as shading, does not exist, but the 1st means, the 3rd, the 4th, the 5th, and the 6th means can be effectively carried out, for example, when only the wiring electric conduction films 30 and 31 are formed.

[0075]

[Effect of the Invention] the above explanation -- the Ming kana -- according to the 1st means of this invention, the short circuit accident of an electric conduction film and a transparent electrode occurs like -- or since resistance reduces each transparent electrode sharply with the electric conduction film which contacts, it can mitigate problems, such as a cross talk, and a contrast fall or

wiring ****** 30 and 31 backed even if the wiring electrode 26 and the pixel electrode 23 might receive the injury and might result in the open circuit in the exterior of a sealing agent 24, it does not result carefully.

[0076] the light which leaks from the leaver section of the electric conduction film of a substrate 21 according to the 2nd means -- shading of a substrate 11 -- since it is shaded by the member 17, contrast does not fall

[0077] Since the state for a connection of each transparent electrode can be easily inspected visually through a portion without an electric conduction film from the rear face of a substrate 21 according to the 3rd means, reliable display can be offered.

[0078] Since the front face of a pixel electrode serves as almost uniform height according to the 4th means and rubbing can be performed uniformly, orientation nonuniformity does not arise, and since a substrate interval can also be equalized, display nonuniformity can be reduced.

[0079] Since the whole front face of a substrate 21 can be mostly made into homogeneity according to the 5th means, a substrate interval is equalized further.

[0080] Since it is shaded by the layer of an insulating material which has shading nature, it becomes unnecessary moreover, for the light which leaks from the leaver section by the slit 51 of the shading electric conduction film 25 between pixel electrodes according to the 6th means to prepare a shading member in an opposite substrate.

[0081] Furthermore, according to the 7th means, if the wiring electrode 26 or the pixel electrode 23 removes a connection with other members in the exterior of a sealing agent 24, since it is covered by the resist 54, doing an injury of it to an electrode at the time of substrate separation is lost, and it can also reduce the corrosion accident by dust etc. sharply.

[0082] According to the means of the octavus, each electrode does not receive an injury by temporary electric discharge of static electricity.

[0083] The so-called seizure phenomenon that to active-matrix type display seen can also be reduced, and, moreover, orientation nonuniformity is not produced except that the fall of a poor display, such as nonuniformity, and contrast is lost, in order that according to the 9th means adsorption fixation may be carried out at an ion adsorption layer and the ionicity impurity contained in a liquid crystal layer may inactivate. [many]

[0084] Thus, the place which contributes to this invention canceling the trouble which the Prior art had, and offering display quality and a reliable liquid crystal display is large.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] In drawing showing the 1st example which shows the 1st of this invention, and operation of the 3rd means. (a) is the plan of a substrate 21 and (b) is the AA' cross section.

[Drawing 2] In the elements on larger scale of the 1st example of this invention shown in drawing 1 , (a) is the plan of a substrate 21, (b) is the AA' cross section, and (c) is BB' cross section.

[Drawing 3] In drawing showing the 2nd example of this invention, (a) is the plan of a substrate 21 and (b) is the AA' cross section.

[Drawing 4] (e) is the cross section showing the manufacture process of a substrate 21 from (a) in drawing showing the 3rd example of this invention.

[Drawing 5] (c) is the cross section showing the manufacture process of a substrate 21 from (a) in drawing showing the 4th example of this invention, and (d) is the AA' cross section in (c).

[Drawing 6] (c) is the cross section showing the manufacture process of a substrate 21 from (a) in drawing showing the 5th example of this invention, and (d) is the AA' cross section in (c).

[Drawing 7] (c) is the cross section of a substrate 21 from (a) in drawing showing the 6th example of this invention.

[Drawing 8] It has the conventional electric conduction film, and is the cross section of the liquid crystal display using

15 Spacer
21 Substrate
23 Pixel Electrode
25 Shading Electric Conduction Film
26 Wiring Electrode
30 Wiring Electric Conduction Film
31 Wiring Electric Conduction Film
51 Slit
53 Resist (Packed Bed)
54 Resist (Packed Bed)

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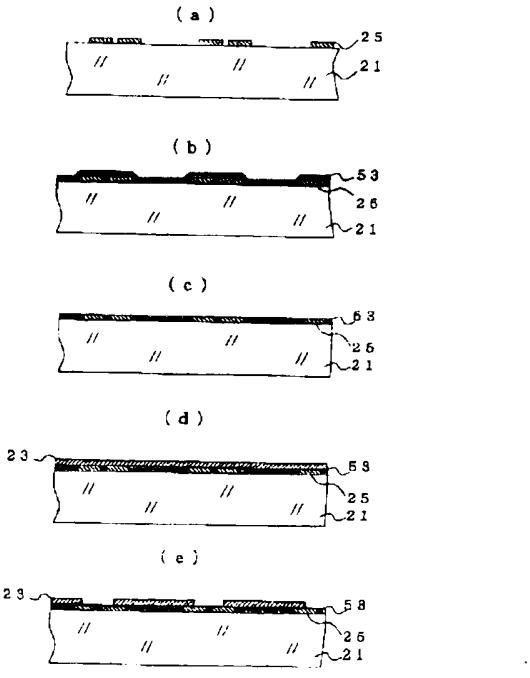
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(54)【発明の名称】　液晶表示装置

(57)【要約】

【構成】　基板上に於いて、導電膜上に、絶縁膜を介する事なく透明電極を設け、かつ該導電膜は個々の透明電極に対応してスリットを設けて分離する。導電膜のない前記画素部の画素電極下に、導電膜面とほぼ同一かそれより高い高さの透明な充填層を設ける。

【効果】　透明電極の抵抗値が下がり、クロストーク等が減少し、かつ導電膜と透明電極の短絡事故がなくなる。画素部のラビングが均一に行われる。



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【特許請求の範囲】

【請求項１】　基板上に於いて、導電膜と導電膜上に設けられた透明電極との間に絶縁膜を設けない構造を有する事を特徴とする液晶表示装置。

【請求項２】　基板上に於いて、画素部を避けて設けた導電膜上に、絶縁膜を介する事なく画素電極を設け、かつ該導電膜は個々の画素電極に対応してスリットを設けて分離した事を特徴とする請求項１に記載の液晶表示装置。

【請求項３】　前記スリットに対応して対向基板上に遮光部材を設けた事を特徴とする請求項２に記載の液晶表示装置。

【請求項４】　基板上に於いて、個々に分離した導電膜上に絶縁膜を介する事なく画素電極と同質でかつ画素電極と分離した配線電極を設けた事を特徴とする請求項１に記載の液晶表示装置

【請求項５】　配線電極または画素電極の他部材との接続部の下部に導電膜のない部分を設けた事を特徴とする請求項２または請求項３に記載の液晶表示装置。

【請求項６】　前記導電膜のない前記画素部の画素電極下に、導電膜面とほぼ同一かそれより高い高さの透明な充填層を設けた事を特徴とする請求項２に記載の液晶表示装置。

【請求項７】　前記導電膜のない前記配線電極または画素電極の他部材との接続部の下部に、導電膜面とほぼ同一かそれより高い高さの透明な充填層を設けた事を特徴とする請求項５に記載の液晶表示装置。

【請求項８】　少なくとも封止材の内側に於いて、画素電極の間に画素電極面または配向膜面とほぼ同一の高さを有する充填層を設けた事を特徴とする請求項１に記載の液晶表示装置。

【請求項９】　前記画素電極間に設けた充填層に遮光性を持たせた事を特徴とする請求項８に記載の液晶表示装置。

【請求項１０】　少なくとも封止材の外側に於いて、画素電極または配線電極の間に、画素電極面または配線電極面または配向膜面とほぼ同一の高さを有する充填層を設けた事を特徴とする請求項１に記載の液晶表示装置。

【請求項１１】　封止材の内側で画素電極または配向膜面とほぼ同一の高さを有する充填層と同一の層を封止材の外側にも設けた事を特徴とする請求項８に記載の液晶表示装置。

【請求項１２】　封止材の内側で画素電極面とほぼ同一の高さを有する充填層が封止材の外側に於いて画素電極または配線電極上を覆うように構成した事を特徴とする

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た充填層をイオン吸着層とした事を特徴とする請求項８に記載の液晶表示装置。

【請求項１５】　充填材をカラーフィルターとして使用する事を特徴とする請求項６に記載の液晶表示装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、液晶表示装置の構造に関するものである。液晶表示装置は基本的には複数の画素を形成するための透明電極（以下画素電極とする）を形成した２枚の基板を、画素電極を形成した面を対向させ、封止材により封止し、これに液晶材料を注入して構成する。個々にはモノクローム、カラー、セグメント型、マトリクス型、アクティブ型、パッシブ型あるいはＴＮ、ＳＴＮその他のモード等の違いにより、構造が異なる場合があるが、本発明は何れにも対応可能であるが、以下の説明はＳＴＮ　パッシブマトリクス型モノクローム液晶表示装置を代表として説明する。

【０００２】

【従来の技術】以下図面に基づいて従来技術を説明する。図８（ａ）は一方の基板２１にチップオングラス（以下ＣＯＧとする）技術を用い、他方の基板１１は画素電極１３をフレキシブルシート等の配線部材３３に直接接続する、通常の実装方式を使用する従来のパッシブマトリクス配列のモノクローム液晶表示装置の構造を示す断面図であり、（ｂ）は（ａ）に於けるＡＡ'断面図である。図８（ａ）、（ｂ）に於いて第１の基板１１と第２の基板２１は封止材２４によって封止され、この封止領域内に液晶１４が注入される。両基板間の間隔（以下基板間隔と言う）はスペーサー１５によって規制される。

【０００３】第１の基板１１には画素電極１３が設けられる。第２の基板２１上には遮光導電膜２５が設けられ、遮光導電膜２５の上に絶縁膜２８が設けられ、絶縁膜２８上に画素電極２３が設けられる。画素電極１３と２３とには実際には配向膜が設けられているが簡単のため図示を省略して有る。基板１１、２１の外側にはそれぞれ偏光板１２、２２が設けられる。

【０００４】画素電極１３と２３は、それぞれ直交して所定に配列され、両者の交差する部分が画素となる。画素電極２３は封止材２４の外側で、駆動集積回路４０の出力端子４１に接続される。駆動集積回路４０の入力端子４２は画素電極２３とは分離し、かつ画素電極２３と同質で透明電極（以下配線電極とする）２６に接続され、配線電極２６はフレキシブルシート等の配線部材３２に接続される。また基板１１の画素電極１３は直接に

【０００５】

加されないため、表示に不都合な状態を呈して表示コントラストを低下させる場合があり、これを防ぐため非画素部に井桁状に遮光用の膜を設ける場合がある。この膜は非導電性、導電性のいずれであっても良いが、遮光特性や膜厚が他の特性に与える影響を考慮して導電性の膜が使用される場合が多い。

【０００６】図８は遮光導電膜２５を遮光膜として用いた場合を示しており、この遮光導電膜２５は上述の如く画素が配列されている部分（以下表示部とする）の非画素部に井桁状に設ける他、封止材２４の近傍の見切りとして、あるいは封止部分の基板間隔を表示部のそれと一致させる目的で表示部以外の部分にも伸張される場合がある。図８では封止部分の基板間隔を表示部の基板間隔と一致させる目的で遮光導電膜２５を封止材２４の下まで伸張して間隔調整導電膜２９形成し、さらに基板１１の封止部分には基板間隔調整用の間隔調整電極１６を設け、基板２１の封止部分には基板間隔調整用の間隔調整電極２７を設けている。

【０００７】上記ＣＯＧ技術は特に細密な画素電極１３、２３を有する表示装置の実装方法として有効である。またこの様に細密な画素電極１３、２３を有する表示装置にあっては表示部に於ける画素部と非画素部の面積比（有効画素面積）が低下してコントラストが低下する傾向にあり、遮光膜が必要となる事が多い。

【０００８】

【発明が解決しようとする課題】ＣＯＧ技術の問題点の一つは、駆動集積回路４０が基板２１上に設けられるため、その電源線の抵抗が上昇する傾向にある点である。すなわち、配線部材３２と配線電極２６との接続抵抗、配線電極２６自身の配線抵抗、配線電極２６と駆動集積回路４０の入力端子４２との接続抵抗等の付加がその原因となるが、このうち配線電極２６自身の配線抵抗による影響が特に大きい。液晶駆動電圧に関係する電源線の抵抗増加は、液晶に印加する駆動電圧の波形に歪みを生じさせ、理想波形からのズレを生じ、クロストークやコントラスト低下の原因となる。

【０００９】また画素電極２３の集積回路４０への引き回し部分は極めて狭い範囲に集中的に寄せ集めるため、この部分では画素電極２３は極めて細い線幅となり抵抗が増大し、これもクロストークやコントラスト低下の原因となる。さらに各画素電極２３は、引き回し部分の長さがそれぞれ異なるため抵抗値が一定とならず、表示状態が均一にならないと言う問題も生ずる。そして画素電極２３の表示部における抵抗は画面の左右（あるいは上下）で表示の明るさが異なると言う現象を生じさせる原因にもなる。そこで本発明が解決しようとする第１の課題は、配線電極２６の配線抵抗を低下させる事であり、画素電極２３の駆動集積回路４０への引き回し部分、あるいは表示部の画素電極２３の抵抗を低下させる事である。

【００１０】次に遮光膜として用いる遮光導電膜２５は、絶縁膜２８により画素電極２３と絶縁されているのであるが、それにもかかわらずしばしば遮光導電膜２５と画素電極２３の間で電気的短絡が起こり、歩留まりを大幅に低下させてしまう。その原因としては、例えば絶縁膜２８に発生した微細なピンホールが挙げられる。このピンホールを完全に無くすことは現在のところ非常に難しい。また他の原因としてはゴミによるものが挙げられる。

【００１１】画素電極２３と遮光導電膜２５の短絡する箇所は、主として封止材２４の近傍で有る事が多い。すなわち前述の如く封止部分の基板間隔を表示部のそれと一致させる目的で表示部以外の部分にも伸張した場合、封止部分の遮光導電膜２５の面積はかなり大きなものとなり、短絡発生の確率が上昇する事に加え、一般に封止部分に加わる応力の方が表示部に加わる応力よりも大きいからである。しかし表示部での短絡も零ではない。そこで本発明が解決しようとする第２の課題は画素電極２３と遮光導電膜２５との短絡問題をなくす事である。

【００１２】次に、スペーサー１５によって規制される基板間隔は液晶のスレッショルド電圧に関係し、基板間隔が異なると同一駆動電圧を印加しても同一の表示状態とならない。そこで本発明が解決しようとする第３の課題は、基板間隔を均一化し、基板間隔の不均一性に依存する表示状態の品位低下を解消する事である。

【００１３】さらに封止材２４の外部に於いては付着したゴミ等が原因で透明電極に腐食を生じたり、隣合う電極間が短絡したりする事故が発生する。また工程内で余分な基板部分を切り離す時に封止材２４の外部の電極に傷をつけてしまい、断線を生じる場合もある。ＣＯＧ技術を用いた場合は前述のように画素電極２３の集積回路４０への引き回し部分は極めて狭い範囲に集中的に寄せ集めるため、この部分では画素電極２３は極めて細い線幅となり、これらの事故は特に問題となる。そこで本発明が解決しようとする第４の課題は、封止材２４の外部に於ける画素電極２３あるいは配線電極２６の断線に対し対策を施す事である。すなわち一つは透明電極２３あるいは配線電極２６に断線が生じて致命的な事故に至らない様に対策する事であり、他の一つは透明電極２３あるいは配線電極２６を保護する事である。

【００１４】さらに、液晶表示装置においては前記配向膜をラビングして液晶の配向を整える工程が有るが、この工程内あるいはそれ以外の工程に於いて、配線電極２６あるいは画素電極２３に静電気が発生し、この静電気の放電時に各電極が損傷を受ける場合が多い。そこで本発明が解決しようとする第５の課題は、各電極に静電気が発生しても放電による電極の損傷がないように対策する事である。

【００１５】また液晶層に含まれるイオン性不純物は、ムラ表示、焼き付き等の表示品位の低下の原因になる事

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が知られている。本発明の第6の課題は、この問題について提案されている公知の技術を効果的に適用可能にする事である。

【0016】

【課題を解決するための手段】上記第1から第4の課題を解決するために本発明が用いる第1の手段は、絶縁膜28を廃止し、基板上に設けた導電膜上に絶縁膜を介する事なく透明電極層を設ける構造とし、かつ各配線電極26、各画素電極23に接する該導電膜を各透明電極毎に分離する事である。

【0017】第2の手段は基板11に、基板21の遮光導電膜の分離部分に対応する遮光部材を設ける事であり、第3の手段は各透明電極と、フレキシブルシートあるいは駆動集積回路等の他部材との接続部分の下部に於いて導電膜のない部分を設ける事である。

【0018】また第1の手段は導電膜のない部分に透明でかつ絶縁性の材料によりなる、導電膜面とほぼ同一の高さの層を設ける事であり、第5の手段は画素電極の間に、絶縁性の材料よりなる、画素電極面または配向膜面とほぼ同一の高さの層を設ける事であり、更に第6の手段は画素電極間に設けた前記絶縁性の材料よりなる層に遮光性を持たせる事である。

【0019】本発明が用いる第7の手段は、第5の手段の実施に於いて前記絶縁性の材料よりなる、封止材の内側でほぼ画素電極面と同一の高さを有する層が封止材の外側に於いて画素電極または配線電極上を覆うように構成する事である。

【0020】本発明が用いる第8の手段は、前記第4、第6の手段の実施にあたり、絶縁性の材料によりなる層に導電性の材料を混入する事である。

【0021】本発明が用いる第9の手段は、前記第5の手段の実施にあたり、絶縁性の材料によりなる層をイオン吸着層とする事である。

【0022】

【作用】本発明が用いる第1の手段によれば、導電膜は最初から配線電極26あるいは画素電極23に接しており、かつ各電極毎に分離しているのであるから、新たな短絡事故は発生する事がないし、各透明電極は接触する導電膜によって抵抗値が大幅に低減する。また配線電極26、画素電極23は封止材24外部に於いて導電膜により裏打ちされているから、断線しても大事に至らない。第2の手段によれば基板21の遮光導電膜の分離部分から漏れる光は基板11の遮光部材によって遮光されるのでコントラストが低下しない。

【0023】第3の手段によれば基板21の裏面から導

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ムラが生じないし、基板間隔も均一化出来る。

【0025】第5の手段によれば基板21の表面全体をほぼ均一にする事が出来るから、基板間隔がより一層均一化される。

【0026】また第6の手段によれば画素電極23の間の遮光導電膜の分離部分から漏れる光は、遮光性を有する絶縁性の材料の層により遮光されるから、対向基板11に遮光部材を設ける必要がなくなる。

【0027】第7の手段によれば封止材24の外部に於いて、配線電極26、画素電極23は絶縁性の材料による層に覆われるから、基板切り離し時に電極に損傷を与えることがなくなり、またゴミ等による腐食事故も大幅に低減できる。

【0028】第8の手段によれば、隣接する各電極間は絶縁性を低下させた層により短絡されるから、各電極に静電気が発生しても電極間で徐々に漏洩し、瞬間的に放電する事がないため、電極が損傷を受ける事がない。

【0029】第9の手段によれば液晶層中に含まれるイオン性不純物がイオン吸着層に吸着固定され不活性化するため、ムラ等の表示不良、コントラストの低下がなくなり、かつ配向ムラを生じない。

【0030】

【実施例】以下、本発明の実施例を図面によって説明するが、図面は構造のみを示すものであって寸法などについて示すものではない。また符号は図8と同一のものについては同一の符号を用いる。さらに本発明に於いて導電膜とは透明電極とは異なるものを言う。

【0031】図1（a）は本発明の一実施例を示す基板21の平面図であり、図1（b）は図1（a）のAA'断面図である。図1においては本発明の第1の手段と第3の手段を同時に実施している。

【0032】図1に於いて、基板21の全面に導電膜が設けられた後、エッチング等により配線電極26の裏打ち用の配線導電膜30、画素電極23の配線部分の裏打ち用の配線導電膜31および遮光導電膜25が形成される。次に透明電極膜が基板全面に設けられたち、エッチング等により配線電極26、画素電極23が形成される。

【0033】配線電極26、画素電極23と対応するその裏打ち用の配線導電膜30、31の形状は、各透明電極の抵抗値を下げるためには各透明電極よりも大きくする事が望ましいが、酸化等による悪影響、あるいはゴミ等による短絡が考えられる場合は外部に露出しないように各透明電極によって覆うようにしてもよい。図1は裏打ち用の導電膜の形状を各透明電極とほぼ一致させた場合を

に対応して窓が明けられた遮光導電膜２５はスリット５１により各画素電極２３に対応して分離される。スリット５１は光透過を少なくするため可能な限り狭くし、またその位置は遮光導電膜２５が隣の画素電極２３と短絡する事を防ぐため、隣合う２本の画素電極２３の中間が望ましい。

【００３５】図２（ａ）あるいは図１（ａ）に於いては画素電極２３に裏打ちした配線導電膜３１の幅は遮光導電膜２５の幅よりも小さいように示したが、例えば封止材２４の外部に於いて配線部分がモールド材等によって覆われ、配線導電膜３１の酸化等による悪影響、あるいは隣合う配線導電膜３１同士のゴミ等による短絡が問題とならない場合は、配線導電膜３１の幅を遮光導電膜２５の幅と同一としてもよい。

【００３６】再び図１について説明する，図１に於いては画素電極２３の集積回路４０への引き回し部分を簡略に示したが、実際には極めて狭い範囲に画素電極２３を集中的に寄せ集めなければならず、従ってこの部分では画素電極２３は極めて細い線幅となり抵抗が増大する。しかも各画素電極２３の引き回し部分の長さはそれぞれ異なるため抵抗値が一定とならず、表示状態が均一にならないと言う問題も生ずる。本発明によれば画素電極２３の配線部分に配線導電膜３１を設ける事により抵抗の差が小さくなるから、表示状態の不均一の問題点も解決する。

【００３７】また画素電極２３は表示部に於いても画素部分を除いて遮光導電膜２５によって裏打ちされているから抵抗値が下がり、表示画面の端々で表示の明るさが異なると言う問題も生じない。当然の事ながら遮光導電膜２５は各画素電極２３に対応して分離されており、かつ最初から対応する画素電極２３と接しているのであるから、新たな短絡事故は発生する事にない。次に配線電極２６もまた配線導電膜３０によって裏打ちされているからその抵抗値は低減し、前記した問題点は解消される。

【００３８】ここで裏打ち用の配線導電膜３０、３１が不透明で、かつ配線電極２６と配線部材３２との接続部、配線電極２６と駆動集積回路４０の入力端子４２との接続部、画素電極２３と駆動集積回路４０の出力端子４１との接続部の下面全面に設けられていると、ＣＯＧ技術により駆動集積回路４０を基板２１に取り付けた際の配線電極２６、画素電極２３と駆動集積回路４０の各端子４１、４２との接続状態、または配線部材３２を接続した際の配線電極２６と配線部材３２との接続状態を基板２１の裏面から目視検査する事が出来なくなる。

【００３９】そこで図１の実施例に示す如く、例えば配線電極２６の他部材との接続部付近に裏打ち用の配線導電膜３０のない部分３３を設ければこれらの接続状態が基板２１の裏面から目視可能になり、接続信頼性の確保が容易になる。図１には示していないが画素電極２３と他部材との接続部付近を同様の構造としても良い。

【００４０】ところで従来は遮光導電膜２５と画素電極２３との間に絶縁膜２８が存在し、この絶縁膜２８は両者の短絡を防ぐ機能の他、遮光導電膜２５の段差等を吸収し、絶縁膜２８の表面を平坦にするための機能も備えていた。しかるに本発明の図１、図２に示した実施例に於いては、従来例に示した絶縁膜２８が存在しないため、平坦化の機能を果たすものが存在しないから、遮光導電膜２５、あるいは配線導電膜３０、３１の形状による段差はそのまま残ってしまう。

【００４１】この段差による影響は十分に吟味する必要がある。段差に関して検討すべき項目は大きく分けて２点有り、その１つは基板間隔の一定性に関するものである。すなわち基板間隔を表示装置の全面に渡って一定にするための機能はスペーサー１５が負うが、スペーサー１５を単純に散布したときは、スペーサーの位置は確率の問題であり、様々な位置に存在する事になる。従って封止材２４の下部を含めスペーサー１５が存在し得る範囲に於いては出来るだけ段差が少なくなるようにする必要がある。

【００４２】図１、図２に於いては狭いスリット５１で分離された遮光導電膜２５を封止材２４の下部まで伸張した場合を示した。勿論、封止材２４の下部は広い間隔で隣接する配線導電膜３１が対応するようにしても良いのであるが、例えば図２（ａ）に於いてスペーサー１５がＤの位置に有る場合とＥの位置に有る場合とではスペーサーの高さが導電膜の厚みの分だけ異なるのであり、上記の点を考慮し封止部分の基板間隔を表示部の基板間隔と一致させるためには封止材２４の下部の基板構造は出来るだけ表示部分の基板構造と類似させる事が望ましいのである。

【００４３】上記Ｄ、Ｅなる位置は隣接する透明電極２３の間を示したのであるが、勿論隣接する透明電極２３の間の間隔よりも透明電極２３の幅の方がはるかに大きいのが一般的であり、従ってスペーサー１５の位置は確率的には画素電極２３の上に存在する場合が多いとの考えも成り立つ。これは相対的に対向基板１１上の透明電極１３との関係についても言えるから、結局表示部に於けるスペーサー１５の大部分は画素上にあるとの見方も出来る。一方封止材２４の下部においては画素部がないから、図２（ｂ）に破線で示すように封止部と画素部ではスペーサーに高さに差が出る事になる。

【００４４】図３は上記の思想基づく本発明の第２の実施例を示し、（ａ）は表示装置の断面図であり、（ｂ）はそのＡＡ’断面図である。図３の実施例に於いては従来の基板１１上の基板間隔調整用の間隔調整電極１６、１７を廃止する。従って図３（ａ）に於いては封止部に於ける基板間隔は基板１１の表面と、基板２１上の配線導電膜３１で裏打ちされた画素電極２３の表面に挟まれるスペーサー１５の径によって規制され、一方表示部に

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於いては対向基板１１上の画素部の透明電極１３の表面と、基板２１上の画素部５０に於ける透明電極２３の表面に挟まれるスペーサー１５の径によって規制される。

【００４５】また図３（ｂ）に於いては封止部に於ける基板間隔は基板１１上の画素電極１３の表面と、基板２１上の間隔調整用導電膜２９の表面に挟まれるスペーサー１５の径によって規制され、一方表示部に於いては基板１１上の画素部の透明電極１３の表面と、基板２１上の画素部５０に於ける透明電極２３の表面に挟まれるスペーサー１５の径によって規制される。

【００４６】そこで導電膜の厚みと基板１１あるいは基板２１上の透明電極１３、２３の厚みをほぼ等しくしておけば、基板間隔は封止部、表示部の全面に渡って均一に保つ事が出来る。

【００４７】また図３（ｂ）に示すように対向基板１１に基板２１上のレジスト５１に対向して遮光部材１７を設けておけば、レジスト５１を溶れる光に遮光部材１７により遮られ、コントラストの低下を防ぐ事が出来る。この遮光部材１７を設けた対向基板１１の構造は従来の方法によるものであっても良いし、本発明に基づくものであっても良い。従来構造を用いるものとすればカラーフィルターも容易に対向基板１１上に設ける事が出来る。

【００４８】しかしながらスペーサー１５の位置は確率的には画素部に多く分布するとしても、図２（ｃ）に破線で示した様に画素電極２３上の、画素部５０より高いところにスペーサー１５が位置する確率も零ではない。もしこの様な状況が発生すると、その付近の基板間隔は他の部分よりも大きくなるため、表示ムラが発生する事になる。

【００４９】また図１（ｂ）に示したように、本発明の第３の手段を実施した場合、例えば配線電極２６の他部材との接続部に於ける配線導電膜３０のない部分３３はその周辺に対して凹部となるため、場合によっては接続に悪影響がでる事が考えられる。

【００５０】さらに段差に関して検討すべき項目の他の１つは、ラビング条件に関するものである。表面の凹凸には簡単のため配向膜を図示していないが、実際には画素電極２３の形成後に配向膜を設け、該配向膜上をラビングして液晶層の配向を規定する。このラビングは通常ロール状の布材を回転させて配向膜を擦る事により行うが、配向膜上に段差があると、該段差部近傍の凹部には布材が十分に触れず、ラビング状態が凸部とは異なってしまう。従って図２（ｃ）の場合、画素部５０が凹状となっているため、凹部の段差が大きいと画素部５０の周

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於いて、先ず基板２１に遮光導電膜２５を形成する。次に（ｂ）に於いて基板２１の全面に絶縁性の透明なレジスト５３を塗布する。（ｃ）に於いて、基板２１の裏面から遮光導電膜２５をマスクとしてレジスト５３を露光、現像し、オーバーエッチを含む適当なエッチングを行うと遮光導電膜２５の存在しない部分がレジスト５３の層で埋められて遮光導電膜２５と段差の小さい面構造を得る事が出来る。（ｄ）に於いて基板全面に透明電極層を設け、（ｅ）に於いて画素電極２３の形状を整える。

【００５２】図４から明らかなように、レジスト５３の層の高さを調整する事により、画素電極２３の画素部に於ける高さを、非画素部よりも高めか、あるいは非画素部とほぼ同一とする事が出来る。従って画素部以外に位置するスペーサー１５があっても、基板間隔には悪影響を与えないし、また画素部上の画素電極２３の表面は均一にラビングされるから配向ムラも生じない。

【００５３】図４の実施例では画素部に限らず、導電膜のない部分には全て同様にレジスト５３の層で高さが均一化されるのであるから、配線電極２６あるいは画素電極２３の他部材との接続部において、目視検査を容易にするために配線導電膜３０あるいは３１を設けない部分３３に生じる凹部も無くなり、接続の安定性がより高まる。

【００５４】図４に於いてレジスト５３に着色すればカラーフィルターとして作用する事は言うまでもない。

【００５５】ところで図４の実施例は、表示部に於ける画素部の面積が非画素部よりも十分に大きく、しかも散布したスペーサー１５が散布後に移動する事がなければ特に問題なく良質の表示状態を得る事が出来る。しかしながら、画素が細密になり、画素部と非画素部の面積比が等しい方向に近づいてきたり、あるいはスペーサー１５が散布後に移動する可能性が有る場合には、スペーサー１５が非画素部に片寄って分布する領域の発生を無視できない。この様な場合、その領域付近の基板間隔は他の部分には比べて小さくなり、基子の態が部分的に他と異なってしまうことになる。

【００５６】図５には本発明の第４の実施例を示す断面図であり、（ａ）から（ｅ）は図２（ｃ）あるいは図４に対応する断面図を工程順に示したものである。図５（ａ）は図４（ｅ）の状態を示す。（ｂ）に於いて基板２１の全面にアクリル樹脂等を主材とする絶縁性のレジスト５４を塗布する。（ｃ）に於いて、基板上面からマスクを用いてレジスト５４を露光、現像し、オーバーエッチを含む適当なエッチングを行うと、画素電極２３の間がレジ

画素部上でも非画素部上でも高さがほぼ同じとなるから、基板間隔を表示部の全面に渡って均一に出来、基板間隔の不均一に基づく表示ムラを防ぐ事が出来る。また図5から明らかなように、導電膜上はレジスト54によって覆われるから、封止材24の外部に於いて導電膜間の間隔を狭くしてもゴミ等による導電膜間の短絡の危険性がない。したがって封止材24の外部に於いて配線導電膜30、31の幅を広げる事が出来るから、より一層各電極の抵抗を下げる事が出来る。

【0058】また図5に示す実施例に於いてレジスト54に顔料を混ぜる等して遮光性を持たせれば、スリット51を漏れる光はレジスト54によって遮光されるためコントラストが低下しない。この場合図3（b）に示した対向基板11上の遮光部材17は省略する事が可能となる。

【0059】図6は本発明の第5の実施例を示す図であり、図5（a）から（d）に対応する断面図である。図6（a）は図4（b）に於いてレジスト53を導電膜の厚みより厚く設けた場合の図4（e）の状態を示す。図6（b）に於いて基板21の全面にアクリル樹脂等を主材とする絶縁性のレジスト54を塗布する。図6（c）に於いて、基板上面からマスクを用いてレジスト54を露光、現像し、オーバーエッチを含む適当なエッチングを行うと、画素電極23の間がレジスト54で埋められて画素電極23とほぼ同一の面が得られる。

【0060】この場合に於いて、レジスト54のエッチングを画素部、および電極の接続部のみについて行うと図6（d）のような構造が得られる。すなわち配線電極26あるいは画素電極23は封止材24の外部に於いて他部材との接続部を除いてはレジスト54によって覆われる。したがって基板切り離し時に電極に損傷を与えることがなくなり、またゴミ等による腐食事故も大幅に低減できる。

【0061】次に図4から図6に示した実施例に於いて、レジスト53または54に導電性の材料を適量混入して置くと、これらの絶縁抵抗を低下させる事が出来る。このようにすれば隣接する配線電極26あるいは画素電極23は比較的高い抵抗値によって短絡されることになり、各工程に於いて電極に発生した静電気は比較的高い抵抗値によって各電極間で中和され、一時的に放電する事がないから各電極が損傷を受ける事がない。

【0062】ところで上記説明に於いては配向膜については特に説明を行わなかった。配向膜は画素電極23上に設ける必要があるが、本発明に於いて第5図または第6図に示す実施例に於いて配向膜を設ける工程は3つの場合が考えられる。

【0063】図7は図6に示した実施例に於いて配向膜を設ける工程を付加した実施例を示す断面図である。図7（a）は図6（c）の工程後に配向膜55を設けた場合を示す。この場合は図6の説明の通り、レジスト54の面の高さは画素電極23とほぼ同一に設ければ良い。

【0064】図7（b）は図6（a）の状態で配向膜55を設け、その後レジスト54を設けた場合を示す。この場合は図6の説明とは異なり、レジスト54の面の高さは配向膜55とほぼ同一に設けるのが良い。

【0065】図7（c）は図6（a）の工程後に配向膜55を設けた後、配向膜55をエッチングするか、あるいは図4（d）の工程後に配向膜55を設けた後、配向膜55と画素電極23をエッチングしてからレジスト54を設けた場合を示す。この場合も図6の説明とは異なり、レジスト54の面の高さは配向膜55とほぼ同一に設けるのが良い。

【0066】図7（b）もしくは（c）の構造とした場合はレジスト54の面は液晶層と直接に接する事になる。この場合は特開平4－320211号公報（以下引例とする）に記載の技術を効果的に実施する事が出来る。すなわちレジスト54をイオン吸着層とすれば、引例の説明にあるように液晶層中に含まれるイオン性不純物がイオン吸着層に吸着固定され不活性化するため、ムラ等の表示不良、コントラストの低下がなくなる他、アクティブマトリクス型の表示装置に多く見られるいわゆる焼き付き現象をも低減する事が出来る。

【0067】ここで前記引例に於いては、その図1にあるようにイオン吸着膜は配向膜上に突起した状態で設けられており、前記のようにラビング時においてこの突起物の周辺ではラビングが正常に行われず配向ムラが生じて表示品質を低下させる恐れが多分に有るが、本発明によればイオン吸着層はほぼ配向膜面と同一であるから、このような表示品位の低下を引き起こす事なく、引例の技術思想を最大限に活用する事が可能となる。

【0068】図7（b）と（c）の差異は、図7（b）の場合はレジスト54は画素電極23とは直接接触しないため、レジスト54に前記第8の手段を用いる事が出来ない。これに対し図7（c）に於いてはレジスト54は画素電極23とは直接接触するから、レジスト54に前記第8の手段を用いる事が出来る。

【0069】図7は図6の実施例を中心に説明したが勿論図5の実施例に於いても同様に適用出来る。

【0070】以上で本発明の実施例の説明を終えるが、補足するならば、本願発明に於いては遮光導電膜25は単に遮光性のみでなく導電性をも重視するのであるから、その材質として比較的導電性のよいものを使用すべきであり、この場合密着性、安定性を考慮して多層構造とする等の配慮は当然本願発明に含まれるものである。

【0071】レジスト53、レジスト54とした層は一般的な工程に則り説明したのであって、機能そのものを表現している訳ではないから、選択的に設ける事が出来る層で有れば特にレジストとは限定しないし、層の材質は有機材でも無機材でもよい。そこで上記理由から上記説明中レジスト53、レジスト54とした部分は充填

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層53、充填層54と定義する。また説明中ではこれらレジスト53、レジスト54を絶縁性としたが、本発明の第8の手段を実施するとこれらは極めて高抵抗ではあるが電流をながすものとなるので、絶縁性との限定はつけない。

【0072】また本発明は表示部の導電膜を遮光導電膜25として説明したが、電熱線等の他の目的に使用される導電膜の場合であっても適用する事が出来る。勿論カラーパネル等、構造的な差や液晶モードが異なっても有効である事は自明である。いわゆるアクティブマトリクスパネルの場合は、この時は画素電極をマトリクス電極と読み変えれば良い。

【0073】また上記説明はCOG技術と共に実施する場合を中心に行ったが、COG技術を用いない場合でも有効である。例えば画素電極23は直接配線部材32と接続される場合であっても、画素を構成する部分から配線部材32までの引き出し部分の抵抗値は出来るだけ小さい事が望ましく、この引き出し部分に本発明の第1の手段を実施する事により抵抗値を下げる事が出来、しかも短絡事故を減少する事が出来る。

【0074】さらに上記実施例は基板21を中心に行ったが、対向する基板11にも同様に本発明の全部若しくは一部を実施する事が出来る。例えば基板11に遮光部材17を設けない場合であっても、本発明の第5の手段は基板11に適用する事が出来る。また例えば第1の手段、第3、第4、第5、第6の手段は遮光等の目的を持った遮光導電膜25のような導電膜が存在せず、配線導電膜30、31のみを設けた場合にも有効に実施する事が出来る。

【0075】

【発明の効果】以上の説明で明かなように、本発明の第1の手段によれば、導電膜と透明電極の短絡事故は発生する事がないし、各透明電極は接触する導電膜によって抵抗値が大幅に低減するから、クロストークやコントラスト低下あるいは表示不均一等の問題を軽減する事が出来る。また封止材24の外部に於いて配線電極26、画素電極23が損傷を受け、断線に至る事があっても裏打ちした配線導電膜30、31により電気的接続が維持されるから大事に至らない。

【0076】第2の手段によれば基板21の導電膜の分離部分から漏れる光は基板11の遮光部材17によって遮光されるのでコントラストが低下しない。

【0077】第3の手段によれば基板21の裏面から導電膜のない部分を通して各透明電極の接続部分の状態を容易に目視検査する事が出来るから信頼性の高い表示装

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【0079】第5の手段によれば基板21の表面全体をほぼ均一にする事が出来るから、基板間隔がより一層均一化される。

【0080】また第6の手段によれば画素電極の間の遮光導電膜25のスリット51による分離部分から漏れる光は、遮光性を有する絶縁性の材料の層により遮光されるから、対向基板に遮光部材を設ける必要がなくなる。

【0081】さらに第7の手段によれば、配線電極26あるいは画素電極23は封止材24の外部に於いて他部材との接続部を除いてはレジスト54によって覆われるから、基板切り離し時に電極に損傷を与えることがなくなり、またゴミ等による腐食事故も大幅に低減できる。

【0082】第8の手段によれば各電極が静電気の一時的な放電により損傷を受ける事がない。

【0083】第9の手段によれば液晶層中に含まれるイオン性不純物がイオン吸着層に吸着固定され不活性化するため、ムラ等の表示不良、コントラストの低下がなくなる他、アクティブマトリクス型の表示装置に多く見られるいわゆる焼き付き現象をも低減する事が出来、しかも配向ムラを生じない。

【0084】このように本発明は、従来の技術が有していた問題点を解消し、表示品質および信頼性の高い液晶表示装置を提供する事に貢献するところは大きい。

【図面の簡単な説明】

【図1】本発明の第1、第3の手段の実施を示す第1の実施例を示す図で（a）は基板21の平面図、（b）はそのAA'断面図である。

【図2】図1に示す本発明の第1の実施例の部分拡大図で（a）は基板21の平面図、（b）はそのAA'断面図であり、（c）はBB'断面図である。

【図3】本発明の第2の実施例を示す図で（a）は基板21の平面図、（b）はそのAA'断面図である。

【図4】本発明の第3の実施例を示す図で（a）から（e）は基板21の製作工程を示す断面図である。

【図5】本発明の第4の実施例を示す図で（a）から（c）は基板21の製作工程を示す断面図であり、（d）は（c）におけるAA'断面図である。

【図6】本発明の第5の実施例を示す図で（a）から（c）は基板21の製作工程を示す断面図であり、（d）は（c）におけるAA'断面図である。

【図7】本発明の第6の実施例を示す図で（a）から（c）は基板21の断面図である。

【図8】従来の導電膜を有しかつCOG技術を用いた液晶表示装置の断面図である。

【符号の説明】

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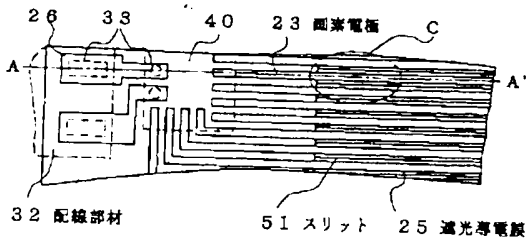
30　配線導電膜
31　配線導電膜
51　スリット

16

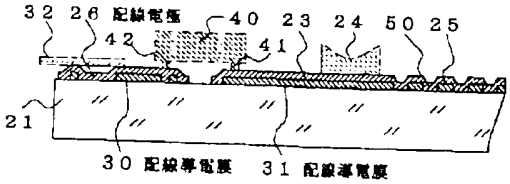
53　レジスト（充填層）
54　レジスト（充填層）

【図1】

(a)

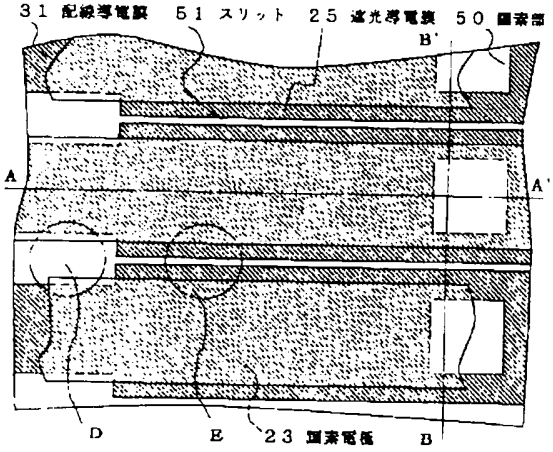


(b)

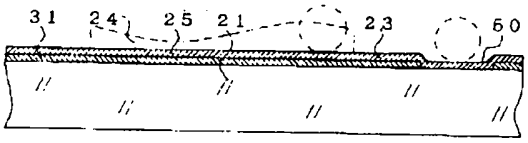


【図2】

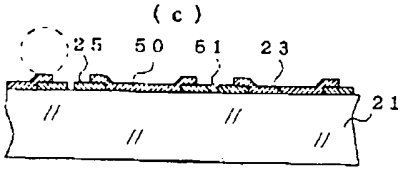
(a)



(b)

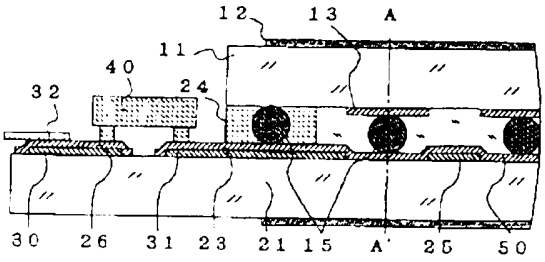


(c)

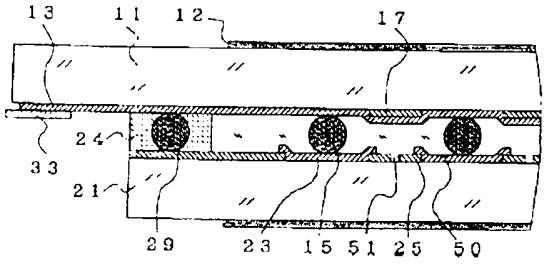


【図3】

(a)

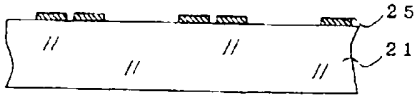


(b)



【図4】

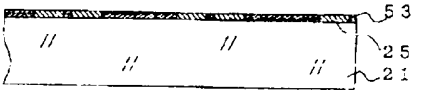
(a)



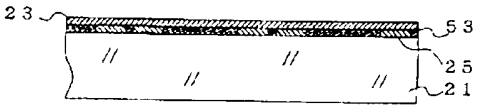
(b)



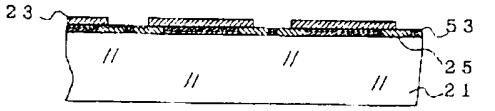
(c)



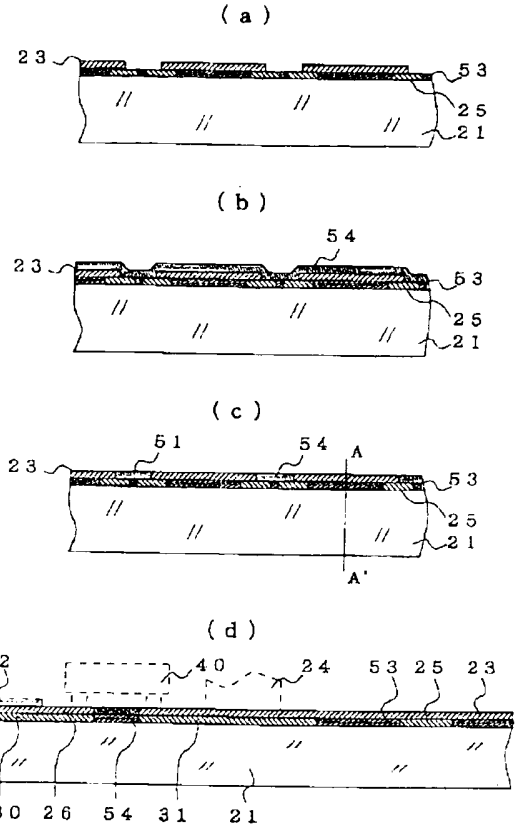
(d)



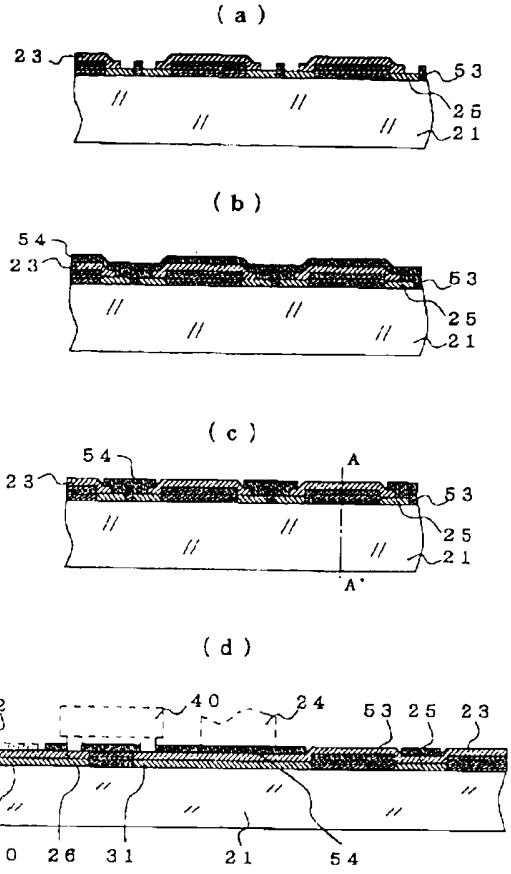
(e)



【図5】

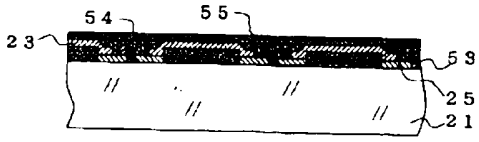

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【図6】

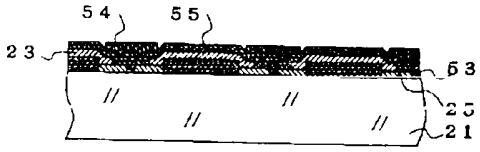

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【図7】

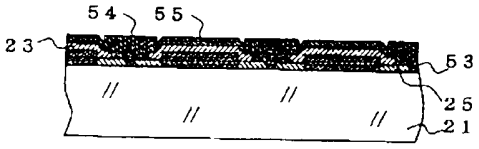
(a)


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(b)

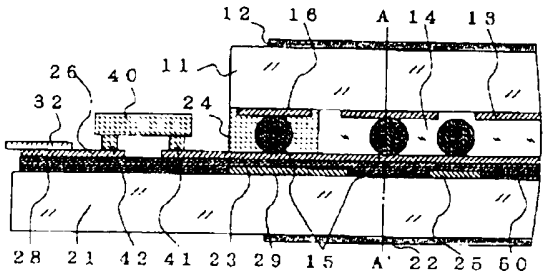

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(c)

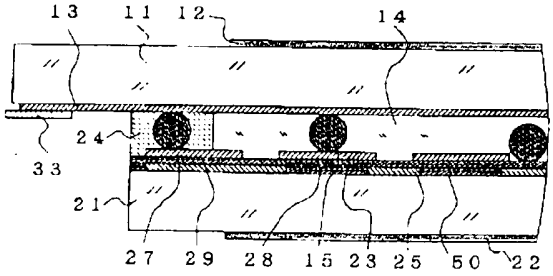

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【図8】

(a)


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(b)


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